

Comparison of Intestinal Parasites in Native and Refugee Patients Admitted to a Territory Hospital in Turkey

Türkiye’de Bir Bölge Hastanesine Başvuran Yerli ve Mülteci Hastalarda Görülen Bağırsak Parazitlerinin Karşılaştırılması

✉ Filiz Demirel, ✉ Bedia Dinç

University of Health Sciences Turkey, Ankara Training and Research Hospital, Clinic of Medical Microbiology, Ankara, Turkey

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ABSTRACT

Objective: This study aimed to evaluate the distribution of intestinal parasites in refugee and native patients who applied to a territory hospital in Turkey.

Methods: A total of 17911 patients who were admitted to our hospital between January 2018 and January 2019 were evaluated retrospectively in terms of intestinal parasites. The patients’ stool samples were investigated for the existence of intestinal parasites by direct wet mount preparation, formalin ether concentration technique and cellophane tape method. The data obtained were compared between patient groups according to the examination method.

Results: The overall prevalence of *E. vermicularis* in refugee children was found twice higher than that in native patients and the most common symptom was abdominal pain in these patients. Intestinal parasite detection rates were significantly higher in the stool concentration method than in the direct wet mount examination. Cutaneous complaints and protein energy malnutrition/growth retardation were the most common clinical conditions besides gastrointestinal symptoms in patients with intestinal parasitosis.

Conclusion: In our study, the prevalence of *Blastocystis* sp. in refugees was found to be higher than in the normal population. Intestinal parasitic infections should be investigated with proper diagnostic methods especially in children with PEM/GR and cutaneous symptoms in addition to gastrointestinal problems.

Keywords: Parasite, refugee, *Blastocystis*, *Dientamoeba fragilis*

ÖZ

Amaç: Bu çalışmanın amacı, Türkiye’de bir bölge hastanesine başvuran yerli ve mülteci hastalarda saptanmış olan intestinal parazitlerin dağılımını değerlendirmektir.

Yöntem: Ocak 2018-Ocak 2019 tarihleri arasında hastanemize başvuran toplam 17911 hasta intestinal parazitler yönünden retrospektif olarak değerlendirilmiştir. Hastaların dışkı örnekleri direkt mikroskopik inceleme ve formalin eter konsantrasyon yöntemi sonrası mikroskopik inceleme ile intestinal parazit varlığı açısından, selofan bant örnekleri ise *Enterobius vermicularis* varlığı açısından incelenmiştir. Elde edilen veriler inceleme yöntemi ve hasta gruplarına göre karşılaştırılmıştır.

Bulgular: *E. vermicularis* prevalansı mülteci çocuklarda yerli hastalara kıyasla iki kat daha fazla bulunmuştur. Bu hastalarda en fazla görülen semptom karın ağrısıdır. Intestinal parazit saptanma oranları konsantrasyon yöntemi sonrası mikroskopik inceleme ile anlamlı derecede daha yüksek bulunmuştur. Intestinal parazit saptanan hastalarda gastrointestinal semptomların yanı sıra en sık kutanöz şikayetler ve protein enerji malnutrisyonu/büyüme gelişme geriliği görülmüştür.

Sonuç: Çalışmamızda *Blastocystis* sp. prevalansı mülteci hastalarda normal popülasyona oranla daha yüksek bulunmuştur. Intestinal parazit enfeksiyonlar gastrointestinal şikayetleri olan hastaların yanı sıra özellikle kutanöz semptomları olan kişilerde ve büyüme gelişme geriliği olan çocuklarda uygun inceleme yöntemleri kullanılarak araştırılmalıdır.

Anahtar Kelimeler: Parazit, göçmen, *Blastocystis*, *Dientamoeba fragilis*



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Address for Correspondence/Yazar Adresi: Filiz Demirel, University of Health Sciences Turkey, Ankara Training and Research Hospital, Clinic of Medical Microbiology, Ankara, Turkey

Phone/Tel: +90 505 457 67 12 E-mail/E-Posta: dr.filiz.demirel@gmail.com ORCID ID: orcid.org/0000-0002-3513-8347

INTRODUCTION

Intestinal parasites have been associated with humans since ancient times and this relationship has been influenced by global changes in the human socio-cultural evolution throughout the history (1). At the present time, intestinal parasitic infections, caused by intestinal helminths and protozoan parasites, continue to be an important global health problem especially in developing countries. In developed countries, protozoan parasites are more common rather than intestinal helminths (2). Low socio-economic status, poor sanitation and crowded living conditions increase the risk of parasitic infections (3).

Intestinal parasitic infections can cause morbidity and mortality particularly in children living in rural areas. These infections may lead to lost ability to attend school or work, malnutrition, anemia, retardation of growth, impairment of cognitive skills and neurodevelopment in young children (4,5). Additionally, immunocompromised patients are more likely to acquire infection and develop severe and disseminated disease with intestinal parasitic infections (6).

Intestinal parasitic infections are also an important public health issue in refugees because of low socio-economic level, insufficient hygiene, living in crowd and poor sanitary conditions (7,8). In recent years, the number of refugees has considerably been increased due to social, political or economic factors. It has been reported that refugees may play a role in incidence of parasitic diseases in industrialized countries (9).

In the last few years, there has been a significant increase in the number of refugees and refugees residing in Turkey. Ankara Training and Research Hospital is a health facility that serves mostly both native and refugee patients with low socio-economic status, in the capital city of Turkey, Ankara. Due to the patient profile, higher rates of intestinal parasitic infections were expected.

The aim of this study was to perform a retrospective analysis of the presence of intestinal parasites in refugee and native patients who applied to a territory hospital in the capital city of Turkey.

METHODS

Ethical Approval

Protocol of the study was reviewed and approved by Keçiören Training and Research Hospital Non-Interventional Ethics Board/Committee (decision number: 2012-KAEK-15/1816, date: 13.02.2019).

Patients

A total of 17911 patients who were admitted to University of Health Sciences Turkey, Ankara Training and Research Hospital, Turkey and who were asked for parasitic examination by the clinicians during the period of 2018-2019 were evaluated retrospectively. Data on demographic and clinical parameters were obtained from the laboratory information management system. Only one sample was included in the study for each patient.

A total of 911, 14,509 and 2.491 patients examined by the cellophane tape method, direct microscopic examination and stool concentration method, respectively, were evaluated. Among all of the patients, 8,748 (48.8%) were female, 9,163 (51.2%) male and 1,121 (6.3%) were refugee and 16,790 (93.7%) native.

Sample Collection and Laboratory Analyses

Fresh stool samples collected from the patients were transferred to the laboratory within 30-60 minutes for direct microscopic examination (wet mount preparation). After macroscopic examination, stool samples were examined by saline/iodine method by laboratory technicians (10). Stool concentration method were performed by using a commercial concentrator tube (Parasep® Fecal Parasite Concentrators, Apacor, USA) and microscopic examination was done with the sediments of each centrifuged sample by saline/iodine method by a parasitologist (11). *Entamoeba* spp., *Dientamoeba fragilis*, etc. suspected samples were stained with Wheatley's trichrome stain (12). Cellophane tape method was used to detect *Enterobius vermicularis* eggs (13). All tests were performed in parasitology section of department of medical microbiology.

Statistical Analysis

Statistical analyses were performed by using the Statistical Package for the Social Sciences (SPSS.26, IBM SPSS Statistics for Windows, Version 26.0, IBM Corp., Armonk, NY, USA). Categorical variables were summarized as counts and percentages. Descriptive statistics (Pearson chi-square test) were used to evaluate statistically significant difference between groups. Statistical significance was defined as $p < 0.05$ (14).

RESULTS

Out of 17,911 patients evaluated in the study, one or more intestinal parasites were detected in 640 (3.6%) patients of which 302 (47.2%) were female, 338 (52.8%) were male ($p > 0.05$). Among the patients intestinal parasite detected, 131 (20.5%) were < 6 , 415 (64.8%) were 6-18, 94 (14.7%) were ≥ 19 years of age ($p < 0.05$).

Of 16,790 native patients, one or more intestinal parasites detected in 526 (3.1%), of 1,121 refugee patients intestinal parasites detected in 114 (10.2%). Intestinal parasite positivity was significantly higher in refugee patient group ($p < 0.05$). The most common protozoan was *Blastocystis* sp., the most common helminth was *E. vermicularis* detected in both native and refugee patients. Distribution of parasite detection rates in native and refugee population were given in Table 1.

E. vermicularis positivity of native and refugee patients were 8% and 16.7%, respectively, by cellophane tape method. The positivity rate of *E. vermicularis* in refugee patients was twice as high as in the native patients, and this difference was found statistically significant ($p < 0.05$).

Intestinal parasite positivity rates according to the stool examination methods were given in Table 2. Intestinal parasites were detected in 0.6% and 19.1% of the all patients by direct wet mount examination and stool concentration method, respectively. Intestinal parasite positivity with stool concentration method was significantly higher ($p < 0.05$).

The most remarkable symptoms/diagnoses in patients with intestinal parasites were protein/energy malnutrition (PEM)/growth retardation (GR), urticaria/dermatitis, gastritis/duodenitis, anemia, abdominal pain and gastroenteritis (Table 3). Intestinal parasite detection rates in both native and refugee patients according to the months were given in Figure 1 ($p > 0.05$).

Table 1. Intestinal parasite detection rates according to the demographic characteristics of the patients

Parasite	Native patients n=16,790		Refugee patients n=1.121	
	n	%	n	%
<i>Blastocystis</i> sp.	301	1.8	70	6.2
<i>G. intestinalis</i>	73	0.4	22	2.0
<i>D. fragilis</i>	54	0.3	6	0.5
<i>Blastocystis</i> sp.+ <i>D. fragilis</i>	11	0.06	0	0
<i>Blastocystis</i> sp.+ <i>G. intestinalis</i>	2	0.01	3	0.3
<i>Entamoeba</i> spp.	12	0.07	2	0.2
<i>H. nana</i>	4	0.02	0	0
<i>Taenia</i> spp.	1	0.01	0	0
<i>E. vermicularis</i>	68	0.4	11	1.0
Total	526	3.1	114	10.2

DISCUSSION

Migration of populations may have an important role in the spread and change of the prevalence of infectious diseases (15). Immigrant and refugee populations have an increased risk for infectious diseases because of poor living conditions (16). Intestinal parasitic infections are also associated with human migratory activities (17).

In the last few years, there has been an increase in migration activity especially from Middle East to Turkey. However, little is known about the presence of intestinal parasites among these refugees. Therefore, in this cross sectional study, it is aimed to determine the prevalence of intestinal parasites among both refugee and native patients, in a one year of period.

The prevalence of intestinal parasites in Turkey varies according to the methods used in the studies and the region where the study was conducted. In a study conducted in Mardin, intestinal parasites were observed in 27.6% of the stool samples examined (18). In a study conducted in Van, one or more intestinal parasites were detected in 34.1% of the patients (19). In two separate studies conducted in İstanbul, the prevalence of intestinal parasites was found to be 4% and 5%, respectively (20,21). In a study conducted in İzmir, intestinal parasites were detected in 6% of the patients (22). In a previous study conducted in Ankara, intestinal parasites were found in 4.2% of the stool samples (23). In our study, total intestinal parasite positivity was found to be 3.7% similar to the studies performed in the western part of

Table 3. Most common symptom/diagnoses in patients

Symptom/ diagnoses	Parasite (+) n (%)	Parasite (-) n (%)	Total (n=17,911)
Gastroenteritis/colitis	72 (0.8%)	8.558 (99.2%)	8.630
Abdominal pain	103 (5.1%)	1.935 (94.9%)	2.038
PEM/GR	69 (17.6%)	323 (82.4%)	392
Urticaria/dermatitis	59 (14.3%)	353 (85.7%)	412
Anemia	25 (6.4%)	367 (93.6%)	392
Gastritis/duodenitis	43 (10.9%)	352 (89.1%)	395

PEM: Protein/energy malnutrition, GR: Growth retardation

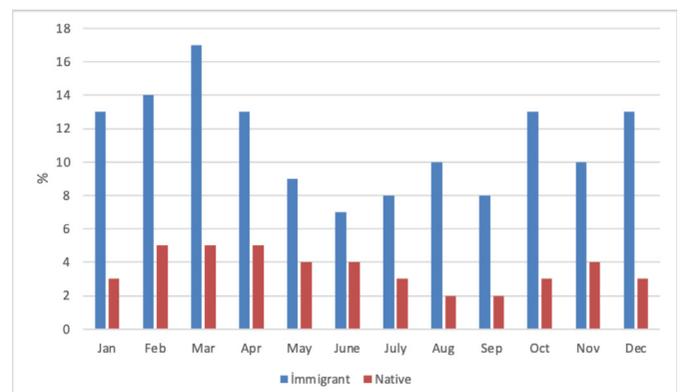
Table 2. Intestinal parasite positivity according to the examination method

Parasite	Direct microscopic examination n=14,509		Stool concentration method n=2.491	
	n	%	n	%
<i>Blastocystis</i> sp.	16	0.1	355	14.3
<i>G. intestinalis</i>	61	0.4	34	1.4
<i>D. fragilis</i>	2	0.01	58	2.3
<i>Blastocystis</i> sp.+ <i>D. fragilis</i>	0	0	11	0.4
<i>Blastocystis</i> sp.+ <i>G. intestinalis</i>	0	0	5	0.2
<i>Entamoeba</i> spp.	3	0.02	11	0.4
<i>H. nana</i>	2	0.01	2	0.1
<i>Taenia</i> spp.	1	0.01	0	0
Total	85	0.6%	476	19.1%

our country. The high difference of intestinal parasite detection rates between the eastern and western regions of our country is thought to be related to the socio-cultural level.

In the current study, overall intestinal parasite positivity was significantly higher in refugee patient group. In particular, the prevalence of *E. vermicularis* in refugee children was found two times higher than in native patients. While *E. vermicularis* was more prevalent in school-age children, it was also common in children under the age of six in refugees. This might be associated with higher household contamination in refugee families. In the studies conducted with refugee children, *E. vermicularis* prevalence were found 1.2% in Italy and 25.2% in Thailand (24,25). It has been reported that parasitic infections among refugee children have a high prevalence supporting the current study. Especially helminth infections transmitted via eggs contaminate the environment and spread the infection to other children (25).

In the current study, the overall prevalence of intestinal parasites detected via stool concentration method were significantly higher than direct wet mount preparation. Direct wet mount preparation is the most commonly used method for the examination of fresh stool samples. However, this method has poor performance in detection of intestinal parasites because of low sensitivity and

**Figure 1.** Intestinal parasite positivity according to the months in native and refugee patients

need for experienced microscopist (26). Additionally, single direct wet mount examination has low sensitivity for diagnoses of parasitic infections. Detection of intestinal parasites can be increased by using concentration techniques (27). In our study, concentrated stool samples were examined by an experienced parasitologist, which may be the reason of high detection rates.

The most prevalent protozoa detected in both native and refugee patients were *Blastocystis* sp., *D. fragilis* and *G. intestinalis*. *Blastocystis* is a protozoan parasite commonly seen in human, but the pathogenesis is still controversial (28). In recent years, some metagenomic studies put forward that *Blastocystis* sp. may be a member of normal microbiota (29). In Turkey, *Blastocystis* sp. is reported as the most common intestinal parasite with the prevalence rate of 0.5-37.9% (30). *D. fragilis* is a neglected gastrointestinal flagellate protozoon. It is little known about the pathogenicity and clinical importance of this parasite. It has been reported that *D. fragilis* is the most prevalent protozoan parasite after *Blastocystis* sp. and as common as *G. intestinalis* worldwide (31). In the study of Sarzhanov et al. (30) in Turkey, the prevalence of *Blastocystis* sp. and *D. fragilis* was found 16.7% and 11.9%, respectively, by qPCR. In another study conducted by Aykur et al. (32) in Turkey, *D. fragilis* prevalence was found 12.04% by real time-polymerase chain reaction. These studies demonstrate that the molecular methods are needed in accurately detecting of *Blastocystis* sp. and *D. fragilis* in stool samples.

In the current study, the most remarkable symptoms/diagnoses in patients with intestinal parasites were PEM/GR and urticaria/dermatitis. PEM is an important health problem in developing countries, leading to GR and decreased physical and mental development in children (33). In our study, PEM was remarkably high especially in refugee children with intestinal parasitosis. It has been reported that refugees may harbour intestinal pathogens without any gastrointestinal problems (34). Therefore, intestinal parasites should be investigated in patients with extraintestinal manifestations such as GR and urticaria, in addition to gastrointestinal symptoms such as abdominal pain and diarrhea.

Study Limitations

The current study has some limitations, primarily due to nature of the retrospective study. The prevalence of the parasites may be underestimated because of single-day examination of samples. For an ideal parasitological examination, at least three samples taken periodically should be examined. Prevalence of sporozoan parasites such as *Cryptosporidium* sp., *Cyclospora cayatanensis* and *Cystoisospora belli* was not determined since modified acid fast staining method could not be performed routinely.

There is limited data about the presence of neglected parasitic diseases among refugee/refugee population in Turkey. Our results indicate the rate of intestinal parasites in refugee patients is significantly higher and this is probably associated with low socio-economic status, poor hygiene and crowded living conditions.

CONCLUSION

When the concentration method is compared with the direct wet mount preparation, it is cost effective in terms of correct and early diagnose of intestinal parasitic infections. Especially children with gastrointestinal problems, PEM/GR and cutaneous symptoms should be examined properly in case of parasitic infections.

*Ethics

Ethics Committee Approval: Protocol of the study was reviewed and approved by Keçiören Training and Research Hospital Non-Interventional Ethics Board/Committee (decision number: 2012-KAEK-15/1816, date: 13.02.2019).

Informed Consent: Retrospective study.

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*Authorship Contributions

Concept: F.D., B.D., Design: F.D., B.D., Data Collection or Processing: F.D., Analysis or Interpretation: F.D., B.D., Literature Search: F.D., Writing: F.D., B.D.

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